

The Principles and Preliminary Results of the Turkish Demographic Survey

JOHN C. RUMFORD, M.A., YAŞAR HEPERKAN, M.D., and NURAY FİNCANCIOĞLU, B.A.

A FUNDAMENTAL problem facing nearly all responsible public health officials in developing nations is the general lack of routine, reliable, and current estimates of natality and mortality. A glance through any one of the United Nations Yearbooks dramatically demonstrates this fact.

The primary reason for this absence of basic data is that the official vital registration systems in these countries are marginal. This marginal state is caused by deep-seated problems inherent in a less developed country. Before an official registration system can function effectively, many built-in cultural and technological advances must be in operation—advances such as attendance at birth by qualified medical workers, a large proportion of births in medical facilities, and a high level of literacy among the populations. Prerequisites for these achievements include adequate per capita income, numerous trained medical personnel and well-equipped facilities, good roads, and communication systems. One could almost define development in terms of the effectiveness of an official vital registration system.

Mr. Rumford is demographic statistics adviser, U.S. Agency for International Development. Dr. Heperkan is survey director and lecturer, Ankara School of Public Health, and Mrs. Fincancioğlu is the administrative officer and chief programmer of the survey, Ankara, Turkey.

Most developing countries cannot afford to wait for a completely functioning official system. They need reliable estimates of population growth and fertility now. This paper describes how Turkey is attempting to obtain this vitally needed information until such time as its official registration system becomes effective.

Initiation of the Survey

In September 1965, after nearly a year of pretesting, the Ministry of Health and Social Welfare of the Republic of Turkey, with assistance from the U.S. Agency for International Development, initiated the Turkish Demographic Survey.

The survey is a household enumeration instrument designed primarily to provide the Ministry of Health with accurate and current natality and mortality statistics. Secondary but important goals are to present annual data on fertility patterns, population movements, age and sex distributions, as well as gross estimates of marital, literacy, and educational status, particularly as they relate to population growth.

The survey was initiated at this particular time for many reasons. Paramount among these are a rapidly expanding population, a recently implemented family planning program (1), and an accelerated effort of the Ministry of Health to bring modern public health facilities and practices to the less developed sections of the country.

Although the demographic survey is tailored to meet the needs and problems of Turkey, these needs and problems are not peculiar to this nation. Nearly every developing country is experiencing unprecedented population growth; modern public health programs are needed and being implemented everywhere. Baseline statistics, evaluation techniques, and estimation parameters are marginal or absent. These experiences are occurring against a geographic and social background similar to Turkey's—a largely rural population practicing subsistence agriculture and living in thousands of small, isolated villages with inadequate transportation facilities, limited financial resources, high birth and death rates, low literacy rates, and inadequate vital registration systems.

Turkey is not the first nation to feel the pressing need for a demographic survey. Similar surveys are currently being carried on in Pakistan (2), India (3), and Thailand (4). Prior to these efforts, excellent pioneer work was done in Mysore, India (5), Guanabara, Brazil (6), and Morocco (7).

Unlike some of the other efforts, the Turkish Demographic Survey was initiated on a regional basis. Regional estimates of demographic events and parameters are necessary in Turkey because of the vast differences in the social and economic makeup and progress of the population. As an example, the geography, customs, and economy of rural eastern Turkey are entirely different from rural western Turkey. Because of these differences the birth, death, and fertility patterns vary tremendously. The effectiveness of a family planning or other public health program can be measured only against a specific set of relative values. A national estimate would tend to mask inherent sectional differences and could even present a false picture.

To provide regional estimates with a reasonable degree of precision and at the same time satisfy the necessities of effective enumeration control and limited budgetary resources, Turkey has been divided into five regions. In addition, because of the peculiar nature of large metropolitan areas, separate surveys are made for the cities of Ankara, Istanbul, and Izmir. In general, region 1 includes the Central Anatolian Plateau; region 2, the Black Sea Coastal Provinces; region 3, the Aegean-Mar-

mara Sea Provinces; region 4, the Mediterranean Coastal Provinces; and region 5, eastern Anatolia. The geographic boundaries of each region are shown in figure 1.

The current overall sample size for any one region is approximately 33,000 persons. The sample size for the entire nation is about 235,000 or slightly less than 1 percent of the country's population. The sample was designed to give each household in Turkey a specific probability of being included in the survey. Each region has been subdivided into rural units—places with 2,000 or less persons, and urban units—places with 2,001 or more persons.

The sampling unit for the rural areas is the village. Every household in a sample village is included in the survey. Thirty randomly selected villages clustered in 30 random districts have been chosen for each region. The sampling unit for the urban areas is a "block." The size of each block is varied so that it contains approximately 100 households. There are 30 such random blocks selected for each region, and a similar number selected in each of the three cities. Based on estimates obtained thus far from the survey, the standard errors range between 4 to 8 percent for the crude live birth rate, 6 to 9 percent for the crude death rate, and 8 to 17 percent for the infant mortality rate.

Because of the magnitude of the survey, it was considered unwise to attempt to enumerate all five regions and the three cities concurrently from the beginning. Such a task would strain the facilities of even the most developed nations. Instead, the Turkish Demographic Survey has been implemented gradually. In 1965, regions 1 and 2 and Ankara were initiated in the survey. In 1966, Istanbul, Izmir, and regions 3 and 4 were added. With the inclusion of region 5 in 1967 coverage of the entire country was attained.

Each regional enumeration is scheduled in the spring and fall of every year. Interviewing must be restricted to these two seasons because in summer the villagers are in the field and in winter the access roads in most rural areas are impassable. Enumerations in the three large cities present no such problem, and these have been scheduled during the midwinter and summer months.

The subject matter of the survey includes



Figure 1. Geographic delineation of regions and cities enumerated by the Turkish Demographic Survey

most of the information recommended by the United Nations plus other material required by the Ministry of Health.

Figure 2 is an English translation of the household registration-enumeration sheet, consisting of seven blocks, currently used in the survey. The blocks contain the following information: 1, the household identification items; 2, enumerator and inspector control data; 3, demographic description of the individual members residing in the household, including number of children ever born and number of children surviving; 4, the incidence of births and selected information concerning births and mothers; 5, the circumstances concerning persons moving into the household; 6, the characteristics of persons who died in the household; and 7, a description of persons moving out of the household.

Data Collection Methods

Two methods are used to collect the data. The first employs a local, resident registrar who visits each household in his assigned area every month and reports the demographic changes which have occurred in the household during the past month. The second method employs a staff supervisor, who independently calls on each of these same households every 6 months. The two reports are matched and all mismatches

are verified in the field or by letter. The methodology of this system is largely based on the work of Chandrasekaran and Deming (8) and Coale (9).

To establish the Turkish system, the resident registrar-enumerator makes a complete initial census of every household in his sampling unit. He fills out in duplicate all the basic census information required in blocks 1, 2, and 3 of the household registration sheet. One copy is sent to the control office in Ankara and one copy is retained by the registrar. At the end of each month, the registrar visits each household in his unit and inquires about the occurrence of a birth, stillbirth, death, in-migrant, or out-migrant. If any of these events has occurred in a given household, he records the event, and the required information concerning the event in blocks 4, 5, 6, or 7, again in duplicate. Block 3 is updated to reflect change in household composition. One copy is sent to the survey's control office and one is retained for the registrar's records.

To facilitate processing, each monthly report for a household is cumulative. The last registration sheet not only contains the events that occurred during the current month but also includes all the events that may have occurred in the household since the sampling unit started on the current enumeration year. For an in-

REPUBLIC OF TURKEY
MINISTRY OF HEALTH AND SOCIAL WELFARE SCHOOL OF PUBLIC HEALTH
TURKISH DEMOGRAPHIC SURVEY
HOUSEHOLD QUESTIONNAIRE

1 LOCATION OF HOUSEHOLD					2 ENUMERATION AND CONTROL											
1 HEALTH REGION:					1 SUPERVISOR:											
2 PROVINCE:					2 REGISTRAR:											
3 DISTRICT:					3 DATE OF SURVEY:											
4 SUB-DISTRICT:																
5 VILLAGE/BLOCK:																
6 STREET AND DOOR NO:																
7 HEAD OF HOUSEHOLD:																
8 SERIAL NO:																
3 RESIDENTS OF HOUSEHOLD									TOTAL							
Serial No.	Name and surname	Relationship to Head	sex	Month and year of Birth	Marital status	Age at first marriage	Educational status	children ever born	children surviving							
1	2	3	4	5	6	7	8	9	10							
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
4 BIRTHS				(1) (2) (3) STILL BIRTHS			(1) (2) (3) LIVE BIRTHS			5 IMMIGRANT			(1) (2) (3)			
Serial No.	MOTHER			sex	CHILDREN					Serial No.	Bl. 3 Serial No.	Relationship to head	Sex	age	Reason	Place
	Bl. 3 Serial No.	Age at Birth	Education		DATE OF BIRTH		Place	Birth order	1							
1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7
1										1						
2										2						
3										3						
4										4						
5										5						
6										6						
7										7						
6 DEATHS				(1) (2) (3) INFANT DEATHS			(1) (2) (3) DEATHS			7 EMIGRANT			(1) (2) (3)			
Serial No.	Relationship of dead	sex	AGE AT DEATH		DATE OF DEATH		Mothers age	place	Serial No.	Relationship to Head	sex	Age	Reason	Place		
			year	week	Month	year									1	2
1	2	3	4	5	6	7	8	9	1	2	3	4	5	6		
1									1							
2									2							
3									3							
4									4							
5									5							
6									6							
7									7							

DO NOT WRITE IN SHADED AREAS

Figure 2. Household registration-enumeration sheet used in Turkish Demographic Survey

migrant, the events are recorded from the day the person moved into the area; for an out-migrant, events are recorded up to the time the person moved out of the area.

At the close of 6 months of reporting, an independent enumeration is made in the sampling unit by a professional survey staff supervisor. He inquires about all vital events that occurred in the household during the previous 6 months.

The completed questionnaires are returned to a survey control center and compared with the last accumulative registrar's reports. All those events and household populations which do not match are withdrawn and a letter or field verification is made. Field verifications are always done by an independent supervisor. The questionnaires are verified or discounted and sent to the processing unit. The census information in blocks 1 through 3 of the registration sheet is then coded and punched. These data form the regional base midyear population which is used for subsequent tabulations at the close of the survey year. In addition, a gross vital event count for the 6-month period is coded, punched, and tabulated. The verified events are categorized as to whether they were present on both the registrar's and the supervisor's records, on the registrar's report only, or on the enumerator's records only.

The monthly reporting is continued by the registrar until the end of the second 6-month period. The sampling unit is then again enumerated by a central staff supervisor. He inquires about the vital events that occurred during the past year, thus providing a 6-month overlap period to aid full coverage. The events are again matched with the registrar's records, and a field or letter verification is made of all nonmatching events and household population inconsistencies.

The vital event information items in blocks 4 through 7 for the entire year are then coded, punched, and tabulated using the previous 6 months' census result for rate computation. The gross vital event count for the second 6-month period is tabulated separately.

The separate tabulations are combined with previous records and vital event summaries are generated semiannually. At the end of 1 full year, the entire process is repeated.

The flexibility of tabulation and punching

schedules is aided by the fact that a separate type of card is punched for each person and event enumerated. The first card is a household card, which contains the household identification information and a summary of the number of persons, live births, infant and noninfant deaths, and gross population movements. The second is a person card which contains all the personal characteristics of each member of the household. The third is a birth card, which includes all the information concerning the occurrence of a live birth or stillbirth. The fourth card contains the in-migration material; the fifth, the occurrence of death; and the sixth card, information on out-migrations.

Within 60-90 days after the close of each semiannual regional enumeration, the household card is used to publish a provisional bulletin which indicates the gross rural and urban enumeration results. Items tabulated are the crude live birth rate, crude death rate, and the infant mortality rate. The sampling error associated with each rate is included. Two rates are shown, the unadjusted and the adjusted rates. As indicated previously, the manner in which each event was recorded is tabulated in three categories: events recorded by both the registrars and the supervisors (N_1), events recorded by the registrars but missed by the supervisors (N_2), and events recorded by the supervisors but missed by the registrars (N_3).

The unadjusted rates are computed using the events calculated by the equation $N = N_1 + N_2 + N_3$. The adjusted rates are computed by the method of Chandrasekaran and Deming (8) as $N = N_1 + N_2 + N_3 + N_4$ where $N_4 = N_2 \cdot N_3 \div N_1$. Essentially, the adjusted estimates include those events probably missed by both recording systems.

As indicated previously, detailed tabulations on personal characteristics are punched and tabulated from the person cards at the mid-survey-year interval. Final tabulations for the complete results of the regional enumeration-registration are tabulated by using the remaining four detailed cards. The target date for bound publication of the results is 90-120 days after the close of the complete enumeration year of any given region. The subjects tabulated for each urban and rural unit of each region are as follows:

1. Distribution of the population, by age and sex.
2. Marital status, by age and sex.
3. Age at first marriage, by sex.
4. Literacy and educational status, by age and sex.
5. Number of children ever born, by age of mother.
6. Number of children surviving, by age of mother.
7. Crude birth and fertility rates, by sex.
8. Live births, by age of mother.
9. Place of live birth.
10. Live births, by month.
11. Birth and fertility rates, by literacy and educational status of mother.
12. Birth order, by age of mother.
13. Birth probabilities, by age and parity of mother.
14. Age-specific death rates.
15. Deaths, by month.
16. Place of death.
17. Infant mortality, by sex.
18. Infant mortality, by age of mother.
19. Infant mortality, by month.
20. Persons moving, by age, sex, and type of move.
21. Reason for persons moving, by type of move and sex.

In December 1966, one complete survey year was attained for regions 1 and 2 and Ankara. Istanbul and Izmir were completed in February 1967. As indicated previously, regions 3, 4, and 5 had not completed a full enumeration year at the time of this report.

Preliminary Results

Although the stability of the data is difficult to predict at this early stage, the preliminary results generated thus far are considered

reasonable if not encouraging in all respects. Table 1 shows the first year's crude birth rate, crude death rate, and infant mortality rate for the areas completed. Generally, the magnitudes of the adjusted birth rates closely resemble those found in the surveys of Pakistan, India, and Morocco, are comparable to earlier Turkish estimates by Gales (10), and are similar to the prevailing rates in many of the developing countries of Latin America (11). The crude death and infant mortality rates, with the possible exception of region 1, rural, however, are lower than anticipated and probably represent underreporting.

The crude birth rates for region 1 of 34 per 1,000 for urban and 54 per 1,000 for rural areas are considered realistic for this area of Turkey. The birth rates for region 2 of 43 per 1,000 for the rural areas and 30 per 1,000 for the urban, however, are somewhat lower than expected. Although the Black Sea region when compared to central Anatolia is considered somewhat better off economically, this factor alone would not account for the lower yields. The crude birth rate of 37 per 1,000 for Ankara is higher than anticipated but may in fact be true. Istanbul's birth rate of 28 per 1,000 and Izmir's 25 are disappointing and seem indicative of underreporting.

The death rates with one or two exceptions are quite similar. The crude death rate of 13

Table 1. Adjusted and unadjusted estimates of selected vital statistics from the Turkish Demographic Survey, by region and area

Region and area ¹	Period covered	Population	Crude birth rate ²			Crude death rate ³			Infant mortality rate ⁴		
			Unadjusted	S.E.	Adjusted	Unadjusted	S.E.	Adjusted	Unadjusted	S.E.	Adjusted
Region 1:											
Urban....	11/65-10/66	1, 915, 400	36	1. 3	38	12	0. 8	13	133	11. 9	140
Rural....	10/65- 9/66	4, 713, 100	51	1. 8	54	18	1. 3	21	174	13. 0	204
Region 2:											
Urban....	11/65-10/66	1, 135, 200	29	1. 4	30	9	. 8	10	85	10. 1	98
Rural....	10/65- 9/66	4, 432, 700	40	2. 0	43	13	. 8	15	139	12. 5	152
Ankara....	12/65-11/66	602, 900	32	1. 7	37	8	. 5	11	86	9. 0	113
Istanbul....	1/66-12/66	1, 533, 400	27	2. 1	28	9	. 8	11	89	14. 8	123
Izmir.....	2/66- 1/67	403, 100	23	1. 5	25	9	. 8	10	83	11. 5	84

¹ Region 1, Central Anatolian Provinces; region 2, Black Sea Provinces.

² Number of live births during the period, divided by the mid-year period population and multiplied by 1,000.

³ Number of deaths during the period, divided by the mid-year period population and multiplied by 1,000.

⁴ Number of deaths among children under 1 year old during the period, divided by the total live births during the period and multiplied by 1,000. For the adjusted estimate, the adjusted number of live births was used as the denominator.

NOTE: S.E. = standard error.

Table 2. Unadjusted survey rates, by method of reporting

Region and area	Crude birth rates			Crude death rates			Infant mortality rates		
	All methods	Registrar only	Supervisor only	All methods	Registrar only	Supervisor only	All methods	Registrar only	Supervisor only
Region 1:									
Urban.....	36	26	33	12	8	10	133	84	115
Rural.....	51	36	44	18	13	15	174	106	132
Region 2:									
Urban.....	29	21	25	9	6	7	85	53	65
Rural.....	40	29	35	13	9	10	139	90	110
Ankara.....	32	23	25	8	5	5	86	45	62
Istanbul.....	27	21	22	9	7	7	89	48	65
Izmir.....	23	16	21	9	6	7	83	32	79

per 1,000 for region 1, urban, may be low for these areas. The death rate of 21 per 1,000 in the rural areas of this region is more realistic. The mortality experience in region 2 of 10 per 1,000 for the urban areas and 15 per 1,000 for the rural sections suggests omissions, and strong efforts are currently being undertaken to improve coverage. The mortality rates for the three cities of 10 to 11 per 1,000 may be somewhat low.

Infant mortality experience is difficult to analyze, particularly since there are not many standards which may be used for comparison. Moreover, because of the large disagreements between the monthly registrar's reports and the semiannual enumeration results, discussed later, the reliability of the estimates is subject to question. However, infant mortality is high in the areas surveyed thus far.

The figures of 140 per 1,000 live births for the region 1 urban areas and 204 per 1,000 for the rural areas probably represent omissions. How numerous these omissions are, however, is difficult to determine. The region 2 experience of 98 per 1,000 for the urban areas and 152 per 1,000 for the rural sections almost certainly represents underreporting, but again baseline comparisons are absent. The infant mortality experience in the three metropolitan areas is equally confusing. Ankara's 113 per 1,000 live births, Istanbul's 123 per 1,000, and Izmir's 84 per 1,000 seem high; however, Gales (10) found similar rates in 1963.

Although it is perhaps premature to discuss geographic differentials because of the preliminary nature of the estimates and the current

lack of accurate age-adjustment parameters, marked differences are indicated between urban and rural areas and between regions. Differences also exist in the three large cities; however, other than the birth rate for Ankara and the infant mortality experience in Izmir, the differences are not extreme.

The birth rate in the urban areas of region 1 is 16 per 1,000 lower than in the rural areas, the death rate is 8 per 1,000 lower, and infant mortality is 64 per 1,000 lower. In region 2, the experience is similar, although to a lesser degree. In the urban areas, births are 13 per 1,000 lower than in the rural areas, deaths 5 per 1,000 lower, and infant mortality 54 per 1,000 lower.

Regional differences are nearly as sharp, with region 1 yielding the higher results. The urban differentials in live births for region 1 are 8 per 1,000 higher than region 2, for deaths 3 per 1,000 higher, and for infant deaths 42 per 1,000 higher. Regional rural differences are even greater with region 1 showing 11 per 1,000 higher for births, 6 per 1,000 higher for deaths, and 52 per 1,000 higher for infant mortality. The differences in the three cities are less extreme, although the data from Ankara suggest that the birth rate is 9 to 12 births per 1,000 higher than in Istanbul and Izmir. The crude death rates are apparently equal for the three cities. Infant mortality differentials vary from a low of 10 per 1,000 between Ankara and Istanbul to 39 per 1,000 between Istanbul and Izmir.

One of the more interesting aspects of the survey lies in the comparison of the two independent methods of data collection. Table 2 reveals

the magnitude of the unadjusted rates for each system.

Apparently, if only the registrars' reports were used, the unadjusted rates would be far lower than was the case. For example, in the rural areas of region 1, the crude birth rate would be 36 instead of 51 per 1,000; the crude death rate, 13 instead of 18 per 1,000; and the infant mortality rate, 106 instead of 174 per 1,000 live births. The supervisors' reports result in a better estimate; however, these too are lower than the combined rates.

Again using region 1 rural areas as an example, the supervisor's results are 7 per 1,000 lower than the combined rate for births, 3 per 1,000 lower for deaths, and 42 per 1,000 lower for the infant mortality rate. The alarming differences between the two reporting methods for infant mortality are difficult to explain. Relatively few events were picked up by both systems in relation to the large number picked up independently by each system. Moreover, the registrars obtained far fewer events than did the supervisors; 75 to 96 percent of the total reported infant deaths were obtained by the supervisors. In contrast, only 40 to 65 percent of all infant deaths were reported by the registrars. The match-rate, that is the same infant death reported jointly by both the registrar and the supervisor, ranged from 25 to 49 percent of the total reported events.

Much of this difference may be attributed to poor performance by the registrars. On the other hand, because of the consistency of this experience, the differences may be intimately tied to the recall period used by each method coupled with the tragedy of an infant death. Both these factors are to the disadvantage of the registrars, who by using a 30-day recall period, are much closer to the tragic moment than are the supervisors who use a 6- to 12-month recall period. Because of this longer interval the respondents may be more likely to report the death after the shock has subsided.

Although the dual Turkish reporting system is currently yielding relatively respectable results considering its immaturity, there are large, chronic methodological and logistical problems. Most of these problems polarize around the omission of events.

The large field-verified differences between

the registrars' reports and the supervisors' results suggest that both systems are omitting events. The exact magnitude of these omissions is extremely difficult to determine. However, by applying the Chandrasekaran-Deming adjustment, it is possible to obtain an estimate of the number of missing events. Table 3 shows the proportion of events which may have been missed by both collection systems.

It is immediately apparent that the omission rate for deaths, particularly infant deaths, is higher than for births. With the exception of Ankara, with an omission rate of 13 percent, from 5 to 6 percent of the births are probably being missed by both systems. Omission rates for deaths, on the other hand, range around 10 percent, again with the exception of Ankara where the rate is a disturbing 25 percent. The data suggest that from 6 to 34 percent of all infant deaths are missed by both systems. By adjusting the survey rates with the suggested omissions, the crude birth rates are increased 1 to 5 per 1,000 and the crude death rates, 1 to 3 per 1,000. These differences are similar to those found in the Pakistan and Thailand surveys. In contrast to these comparatively small and consistent differentials, the correction factors for infant mortality range from 1 per 1,000 in the case of Izmir to a high of 34 per 1,000 in Istanbul.

While the dual reporting system is considered the best tool currently available for obtaining the majority of events that occur in an area, it is not foolproof. In order to work effectively, the two reporting methods must maintain absolute independence. This is difficult and

Table 3. Percentage of events missed by both reporting methods

Region and area	Percentage of—		
	Live births	Deaths	Infant deaths
Region 1:			
Urban.....	5	7	9
Rural.....	6	12	20
Region 2:			
Urban.....	5	9	19
Rural.....	6	10	14
Ankara.....	13	25	34
Istanbul.....	6	10	32
Izmir.....	5	11	6

Table 4. Percentage of additional events obtained, by method of reporting

Region, area, and event	Registrars and supervisors	Registrars only	Supervisors only
Region 1, urban:			
Live births-----	60	10	30
Deaths-----	54	12	34
Infant deaths-----	49	14	37
Region 1, rural:			
Live births-----	58	13	29
Deaths-----	48	21	31
Infant deaths-----	37	24	39
Region 2, urban:			
Live births-----	61	13	26
Deaths-----	51	17	31
Infant deaths-----	39	23	38
Region 2, rural:			
Live births-----	58	13	29
Deaths-----	51	20	29
Infant deaths-----	44	21	35
Ankara:			
Live births-----	47	24	29
Deaths-----	33	33	34
Infant deaths-----	25	27	47
Istanbul:			
Live births-----	62	18	20
Deaths-----	53	22	25
Infant deaths-----	27	27	46
Izmir:			
Live births-----	59	10	31
Deaths-----	48	18	34
Infant deaths-----	35	4	61

expensive. In the Turkish Demographic Survey, elaborate and time-consuming precautions have been taken to maintain independence of reporting methods. The large verified difference between the registrars' reports and the supervisors' results suggest that some success has been achieved in this field. Unfortunately, however, no guarantee can be given that complete independence exists or will remain in all sampling units.

Another extremely serious problem is the fact that both the registrars and the supervisors may consistently miss the same type of event, a factor that can be readily demonstrated. The Turkish survey's household schedule contains a question on stillbirths. The primary value of this question is to increase the likelihood of obtaining reports of live births and infant deaths. Although stillbirth data are extremely useful, the accuracy of this information will remain poor in a developing country until a workable "lay" definition of a stillbirth can be devised which will be suitable for use by a household survey. Such is the case in the Turk-

ish survey thus far; respondents are obviously underreporting stillbirths. Moreover, for the few who have reported these events, both the registrars' and supervisors' results agree nearly 100 percent. The adjusted stillbirth ratios currently range from 7 to 14 per 1,000 live births plus stillbirths. This is an understatement, and, as suggested above, probably constitutes a misunderstanding by the registrars, supervisors, and respondents as to what a stillbirth is.

Other problems which have occurred in conducting the survey are perhaps more pertinent to everyday operations. These have proved troublesome to the Turkish system because of their frequency and in all probability will be experienced by other countries considering a similar survey.

The most common problem centers around the performances of local registrar-enumerators. These workers are the backbone of the Turkish system. Many live in remote areas where the roads are impassable for much of the year. Because of the isolation and the linear distances in Turkey, most registrars are visited by a supervisor only twice each year, at the time when the unmatched events are verified. Unless individual integrity and motivation are high, performance will suffer. The Turkish experience thus far indicates that many registrars do not make complete monthly rounds. One reason for this is that because the registrars live and work in the area, they feel they know their people. This, in most every case, is a misapprehension. Table 4, based on verified events, points up this disturbing situation.

Immediately apparent is the fact that the supervisors are finding 2 to 21 percent more births than are the registrars, 1 to 22 percent more deaths, and 14 to 57 percent more infant deaths. The direction of these discrepancies is not logical. If the registrars were conscientiously making their assigned monthly rounds, there would be no problem of memory decay among those interviewed. Furthermore, in the case of out-migrations, all events which occurred in the households with out-migrants up until the day they moved, should be recorded by the registrars. These events could not be recorded consistently by the supervisor because the original respondents are no longer in the household to report events.

Although such steps as correctional letters, individual conferences, retraining sessions, and disciplinary actions have been and are used to improve motivation and performance, clear-cut evidence of success has not yet been demonstrated.

One of the most difficult problems from a logistical standpoint, but one in which some success has been obtained, is in reconciling household member imbalances. Often, when comparing the registrars' records with the supervisors' reports, the numbers of persons recorded in the household do not agree, yet no event has been recorded to indicate the reason for this difference. Early in the survey, most of these imbalances were noted to be due to out-migrations or in-migrations. Some imbalances, however, were due to births and deaths, particularly infant deaths, which were not reported to the registrar or the supervisor; thus, it was necessary to include the imbalances in the regular field-verification process. Although this procedure is expensive and time consuming, it has proved well worth the effort. However, it can be done properly only if out-migration and in-migration data are routinely included in the survey system.

Regardless of these problems, the Turkish Demographic Survey has thus far begun to meet the requirements of providing the nation with current and relatively reliable natality and mortality estimates in the absence of a functional official vital registration system.

Summary

The Turkish Demographic Survey, initiated in 1965, is a household enumeration instrument designed primarily to provide accurate and current data on vital events. The sample size for the entire nation is about 235,000 persons.

Two methods are used to collect the data. The first employs a local, resident registrar who makes regular monthly visits to each household in his assigned area and reports the demographic changes which have occurred in the household during the past month. The second method employs a staff supervisor who independently calls on the same households every 6 months. The two reports are matched and all mismatches are verified.

The manner in which each event was recorded is tabulated in three categories: events recorded by both the registrars and the supervisors (N_1), events recorded by the registrars but missed by the supervisors (N_2), and events recorded by the supervisors but missed by the registrars (N_3). The rates are adjusted by the equation $N = N_1 + N_2 + N_3 + N_4$ where $N_4 = N_2 \cdot N_3 \div N_1$. Essentially, the adjustment provides an estimate of the events probably missed by both systems.

Because of the immaturity of the survey, coupled with the constant improvements in control procedures, survey estimates are anticipated to be unstable for the next several years.

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